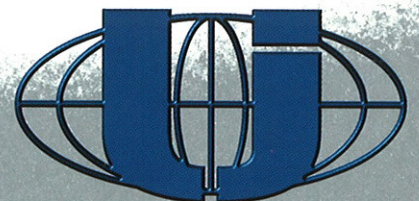




# Nitrox™

 DENITRIFICATION PROCESS



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## DENITRIFICATION PROCESS

### *Cost-Effective Denitrification*

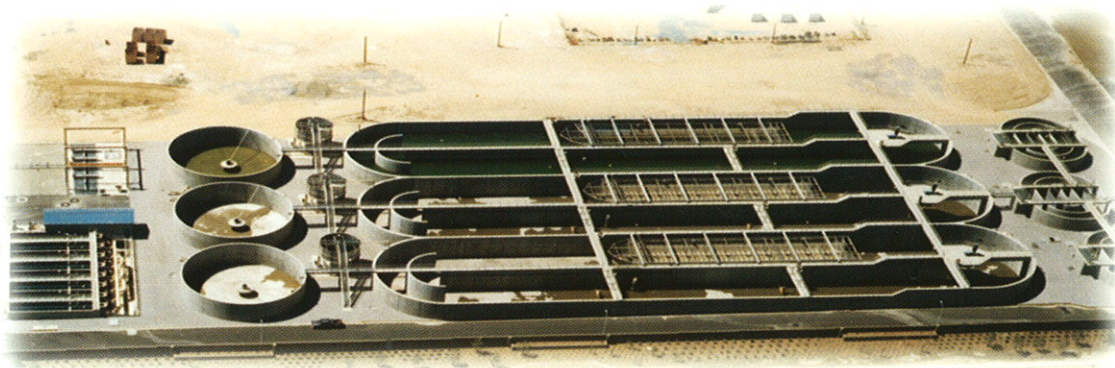
The **NITROX™** denitrification process can provide a cost-effective system for the control and optimization of nitrogen removal in an oxidation ditch system. Nitrogen removal levels from this unique process are equivalent to systems which utilize anoxic tanks in front of the aeration basins. Effluent total nitrogen concentrations of 8 mg/l (24 hr average) are possible, without requiring pre-anoxic tanks and internal recycle pumping. The process can also be utilized to enhance existing external anoxic tanks, to achieve further nitrogen reductions.

The growth of filamentous bacteria is discouraged since a significant amount of the influent BOD is assimilated under completely anoxic conditions. The process also functions as an anoxic selector because filamentous bacteria are not as competitive as facultative bacteria under anoxic conditions. Lower sludge volume index (SVI) values can be achieved resulting in benefits in clarification and sludge processing.

Energy savings can also be achieved using the **NITROX™** denitrification process system. In order to allow for the consumption of nitrate in lieu of oxygen, the aeration system is turned off 20-40% of the time. The high efficiency mixers require only a fraction of the energy to maintain adequate velocities in the ditch. Thus, significant energy savings are possible.



*The oxidation ditch facility at Grand Coulee, Washington was retro-fitted with the **NITROX™** denitrification system. Lower SVI values and reduced energy costs were achieved, along with reductions in the Total Inorganic Nitrogen (TIN) effluent levels.*



*This large water reclamation facility in Southern California uses the **NITROX™** denitrification system, along with **BOAT®** intra-channel clarifiers, **SAC™** bio-control systems, **SIMCAR®** vertical turbine aerators, and the **BULLSEYE™** nutrient removal process. Substantial nutrient removal has been accomplished at this facility which includes the latest US-developed technologies and will ultimately serve over 28 mgd.*

## *Cost Effective Nitrogen Reduction... for new or existing facilities*

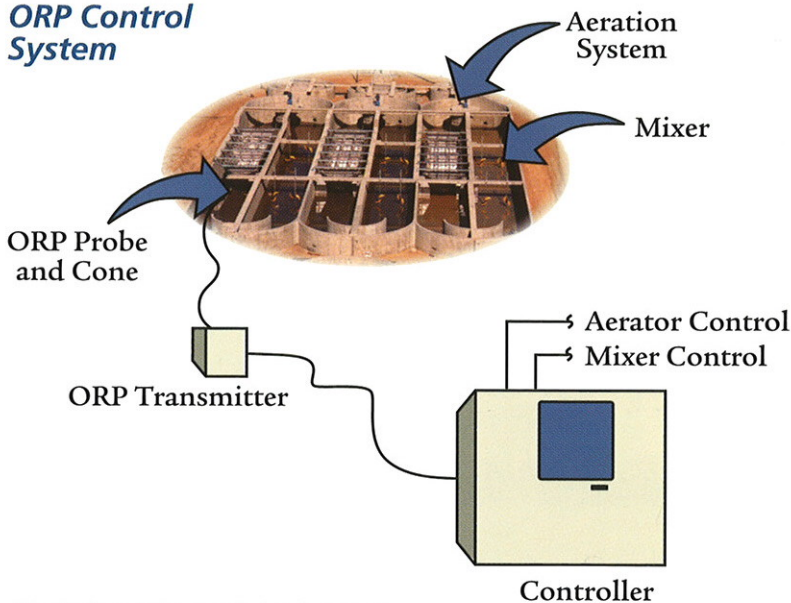
## Ease of Operation

The **NITROX™** denitrification process involves the cycling of aeration tanks through anoxic and aerobic periods. At selected intervals, the aeration system is turned off and a submerged propeller is utilized to maintain mixing. While the aeration system is off, the tank essentially becomes an anoxic basin. Thus, in lieu of the oxygen in the tank, the nitrate is utilized by the bacteria to degrade the influent BOD.

A control system with an ORP sensor automatically determines when the nitrate in the ditch is depleted. When the sensors detect nitrate depletion, the aeration system is reactivated, thereby returning the basin to the aerobic mode of operation. During the aerobic mode, subsurface mixers are not required if surface aeration is utilized. If non-clog diffusers are utilized for the aeration system the subsurface mixers may still be required to provide adequate mixing on a continuous basis. One or more anoxic/aerobic cycles may be used over a 24-hour period in order to achieve a consistently high level of nitrate removal.

This process has proven to be especially effective in oxidation ditch systems. Practically any oxidation ditch can be designed or converted to utilize the **NITROX™** denitrification system. Application of this unique, patented process requires the installation of any efficient subsurface mixer to provide unidirectional flow within the ditch, independent of the surface aeration system. In addition, an on-line ORP sensor is installed in the oxidation ditch to determine the level of nitrate depletion. This sensor is linked to a computer system which controls the aeration and mixing systems. Existing oxidation ditch facilities can be easily retrofitted with the **NITROX™** ORP system, with minimal down-time.

### Automated ORP Control System



*The ORP control system is simple, accurate, and reliable method of establishing the proper mode of operation.*



*This facility is located in a hot, US desert and it originally utilized only a single, trapezoidal oxidation ditch. This ditch was retro-fitted with the **NITROX™** denitrification system to meet the new nitrogen discharge limits. The ditch was also retro-fitted with the **BOAT®** intra-channel clarifier to increase the hydraulic capacity. A new, vertical wall oxidation ditch was added to the treatment facility and it also incorporated the same cost-effective technologies.*



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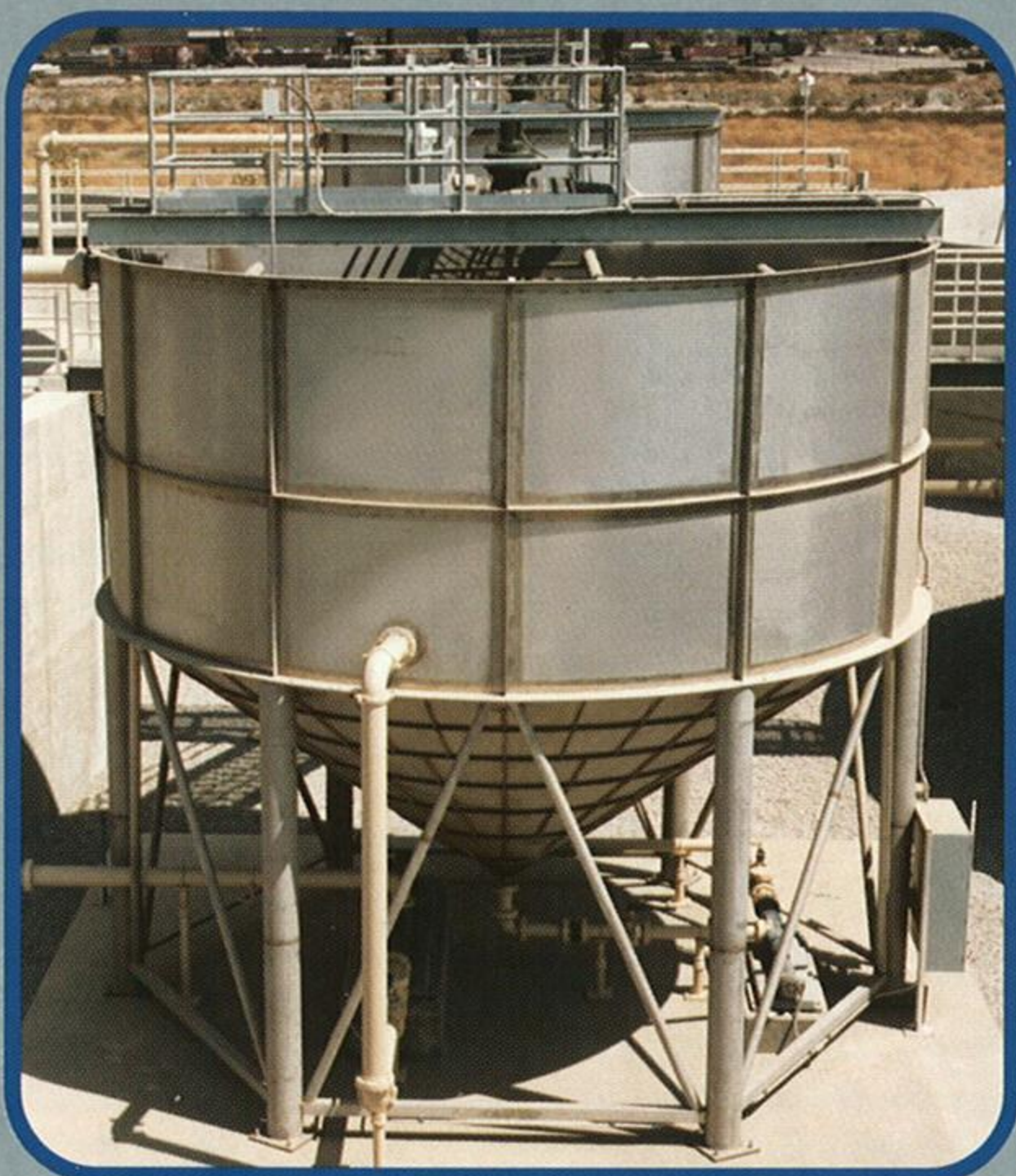
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The terms **Boat®** intra-channel clarifier and **Nitrox™** ORP process are registered trademarks of United Industries, Inc. and Beard International, Inc.

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# Existing Plant Out of Compliance?

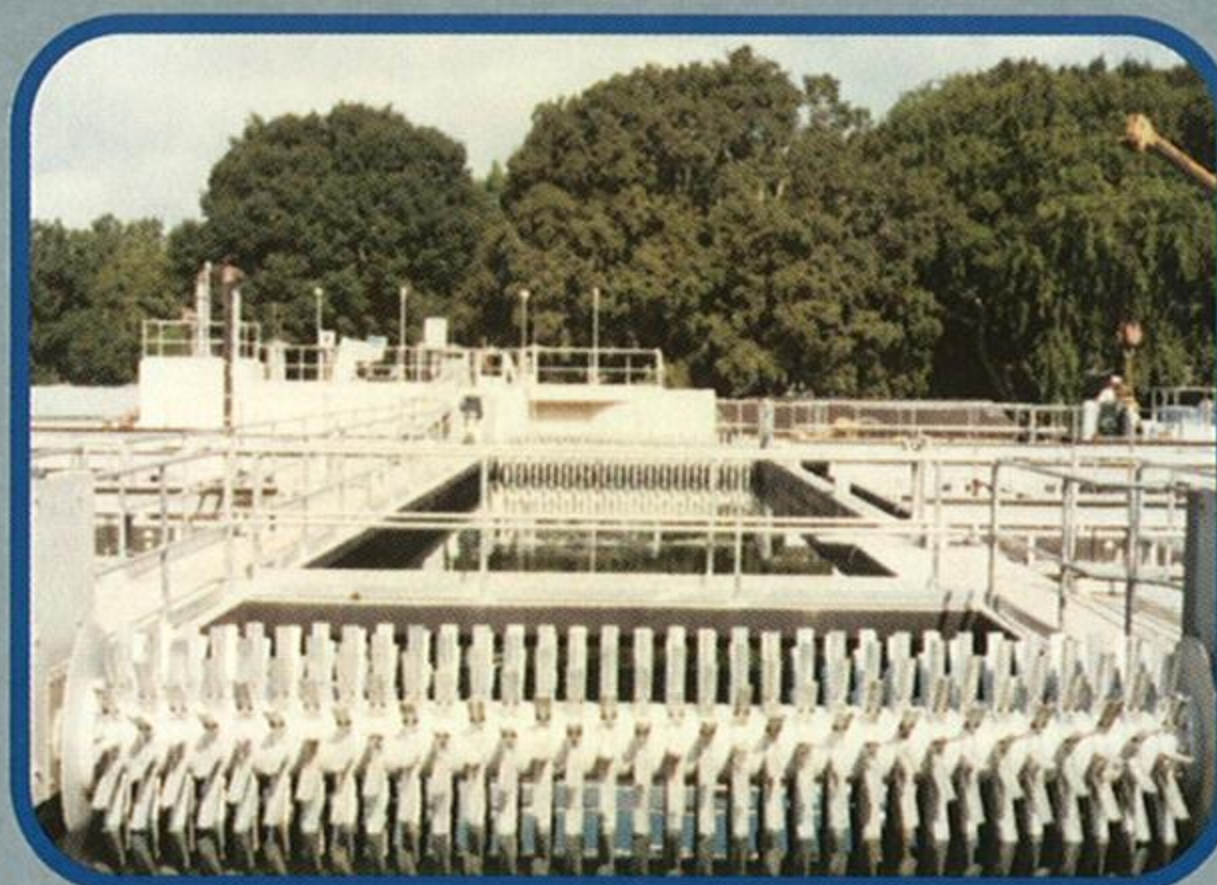
# ***DITCH IT!***



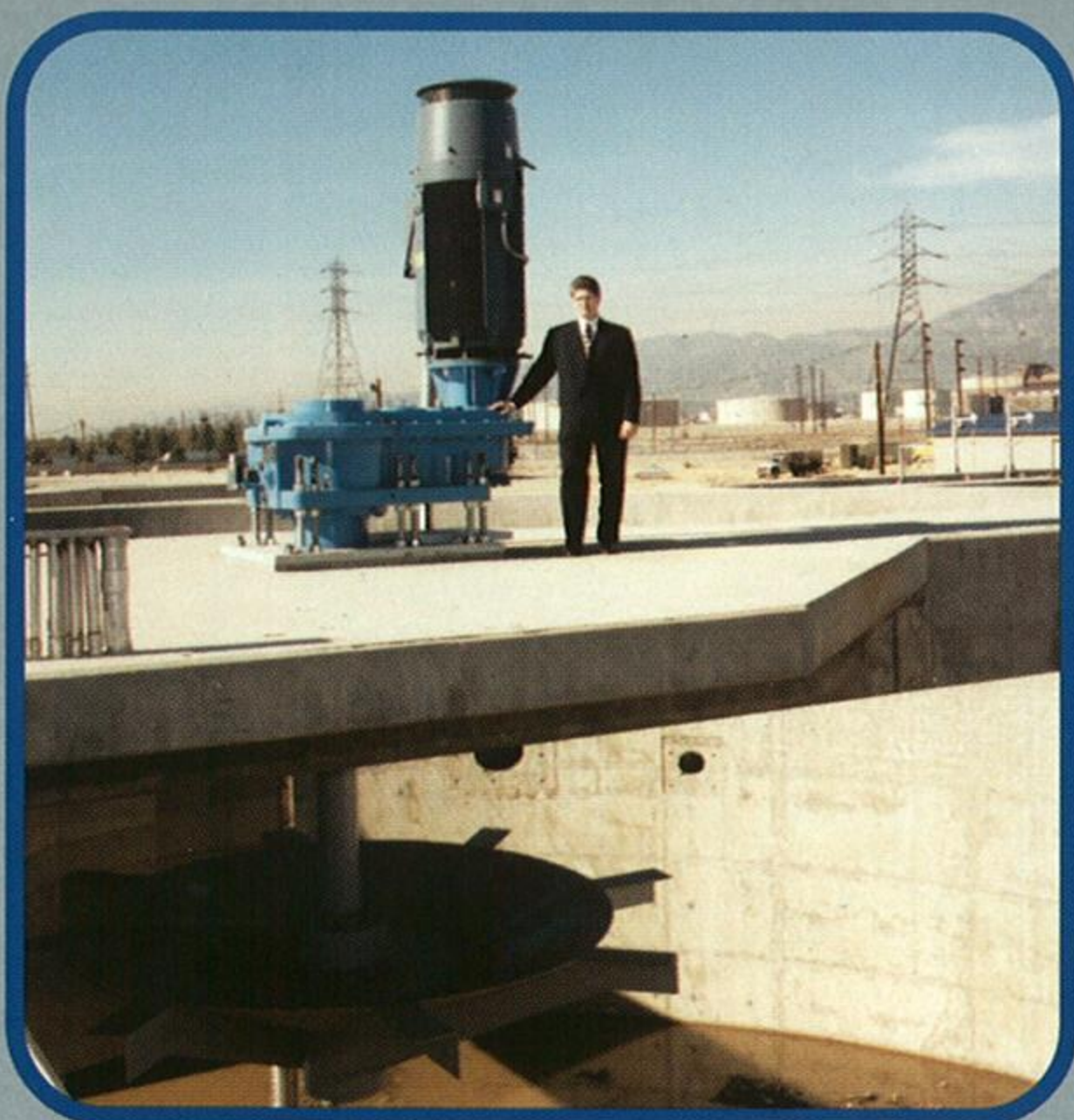
SAC™ bio-control systems



BOAT® Intra-Channel Clarifiers



Airbrush™ rotor aerators



SIMCAR® Aerators

*From the leader in  
oxidation ditch technologies*



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&  
United Industries, Inc.**